STORMWATER MANAGEMENT PLAN
FOR
HOMELAND ESTATES, COUNTY OF SAN DIEGO

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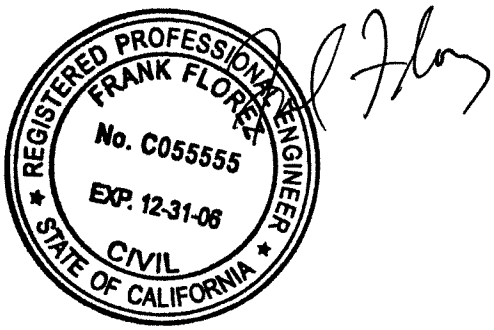

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INTRODUCTION

The Stormwater Management Plan (SWMP) requirement is required under the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (section 67.817). The purpose of this SWMP is to address the water quality impacts from the proposed improvements on the Homeland Estates subdivision, in the County of San Diego. Best Management Practices (BMPs) will be utilized to provide a long-term solution to water quality. This SWMP is also intended to ensure the effectiveness of the BMPs through proper maintenance that is based on long-term fiscal planning. The SWMP is subject to revisions as needed by the engineer.

1.0 PROJECT DESCRIPTION

The scope of this report is Homeland Estates. The project site is located in north-central San Diego County, California, in the community of Escondido. The project site is off the Felicita exit on Interstate 15. The site is located between Miller Avenue and Alexander Drive. The Assessors Parcel No's are 238-231-14,26,27, and 49. (See Attachment A).

Once developed, the site will consist of 9 residential lots with a lot size of approximately 1 Acre each.

1.1 Topography and Land Use

Topography on-site generally slopes from east to west east with elevations ranging approximately 710 feet above MSL in the east portion of the site, to approximately 600 feet above MSL in the west portion of the site. There are no existing homes on the site. The existing land is used for farmland so there is very little vegetation onsite. The area is zoned for 1-acre, as is the surrounding area.
To the North is a 9 lot development and there are existing houses to the south, which are also approximately 1 acre lots.

1.2 Hydrologic Unit Contribution

The Homeland Estates project is located in the Felicita HSA watershed with a San Dieguito hydrologic unit number of (905.23).

The study area occupies a portion of a 2,500-acre watershed, which is primarily comprised of the western slopes of nearby hills. The watershed drains into a creek, which ultimately ends up in Lake Hodges. Lake Hodges flows into nearby San Dieguito River, which empties into the Pacific Ocean. Overall, the project area represents less than 0.5% of the total watershed.

2 WATER QUALITY ENVIRONMENT

2.1 Beneficial Uses

The beneficial uses for the hydrologic unit are included in Tables 1.1 and 1.2. These tables have been extracted from the Water Quality Control Plan for the San Diego Basin.

MUN – Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
AGR – Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
IND – Industrial Services Supply: Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
PROC – Industrial Process Supply: Includes uses of water for industrial activities that depend primarily on water quality.
REC1 – Contact Recreation: Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
REC2 – Non-Contact Recreation: Includes the uses of water for recreational involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
WARM – Warm Freshwater Habitat: Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
COLD – Cold Freshwater Habitat: Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
WILD – Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

2.1.1 Inland Surface Waters

Inland Surface waters have the following beneficial uses as shown on table 1.1

Table 1.1 Beneficial Uses for Inland Surface Waters

Hydrologic Unit Number	Mun	Agr	Ind	Proc	Rec1	Rec2	Warm	Cold	Wild
905.23	x	x	x	x	x	x	x	x	x

2.1.2 Groundwater

Groundwater beneficial uses includes agricultural and municipal.

Table 1.2 Beneficial Uses for Groundwater

Hydrologic Unit Number	Mun	Agr	Ind
905.23	x	x	x

x Existing Beneficial Use

2.2 303(d) Status

According to the California 1998 303d list published by the San Diego Regional Water Quality Control Board, the impaired water body that is associated with this project is Felicita Creek, which is located approximately 2500' west of the site.

3 CHARACTERIZATION OF PROJECT RUNOFF

3.1 Existing and Post-Construction Drainage

The drainage basin for this project empties, ultimately into Lake Hodges and then into the San Diego River further downstream. Please refer to Attachment B, enclosed for the tributary drainage area (TDA). The soil type for this area is type D. This soil is generally not that erosive, under normal rainfall conditions.

A. Total size of construction area – 12.1 acres
B. Total impervious area (including roof tops) before construction – 0 acres
C. Total impervious area (including roof tops) after construction – 2 acres
   Percent impervious before construction: B/A = 0%
   Percent impervious after construction: C/A = 16%

The proposed development increases the impervious area, but with the large size of the lots, the runoff (Q) from the site is slightly increased (see enclosed maps). The downstream underground storm drain system will handle this flow, and no detention facility will be needed.

The preliminary design of this system is included in Attachment B. Summaries of the post-construction water quality flows are included in Table 3.1. Water quality flows were developed using the 85th Percentile Precipitation Map developed by the County, which was obtained from the website http://www.co.san-diego.ca.us/dpw/land/flood.htm.

See the following page for Water Quality flows to the proposed drainage insert. Most of the proposed runoff will be overland flow cleaned by grassy swales draining into brow ditches. The minimal street flow will be cleaned with a proposed private drainage insert.

HYDROLOGY CALCS (SEE DRAINAGE MAPS ENCLOSED)

BASIN	AREA	C	C X A	L_O	L_{MAX}	ΔH	S_o	$T_{o\,t}$	L_t	S_t	T_t	T_c	$I_{(100)}$	$Q_{(100)}$
	(AC)			(FT)	(FT)	(FT)	(%)	(MIN.)	(FT)	(%)	(MIN.)	(MIN.)	(IN/HR)	(CFS)
A	6.56	0.41	2.69	300	100	60	20.0%	4.6	500	1%	1	5.6	7.61	20.5
B	0.95	0.41	0.39	150	70	1.5	1.0%	10.4	350	10%	0.6	11.0	4.91	1.9
C	3.98	0.41	1.63	200	70	2	1.0%	10.4	600	6%	0.8	11.2	4.86	7.9
D	1.93	0.41	0.79	150	70	1.5	1.0%	10.4	650	5%	2.2	12.6	4.50	3.6
E	1.72	0.41	0.71	150	70	1.5	1.0%	10.4	650	5%	2.3	12.7	4.48	3.2
F	3.64	0.41	1.49	450	100	45	10.0%	5.8	600	6%	1.1	6.9	6.66	9.9
G	2.81	0.41	1.15	300	100	30	10.0%	5.8	350	10%	0.6	6.4	6.99	8.1
H	3	0.41	1.23	300	100	60	20.0%	4.6	450	1%	1.3	5.9	7.36	9.1
I	2.37	0.41	0.97	450	100	90	20.0%	4.6	150	1%	0.4	5.0	8.17	7.9
J	3.65	0.41	1.50	150	70	1.5	1.0%	10.4	600	16%	0.6	11.0	4.91	7.4
K	5.12	0.41	2.10	150	70	1.5	1.0%	10.4	350	8%	0.8	11.2	4.86	10.2
L	3.5	0.41	1.44	150	100	15	10.0%	5.8	200	6%	0.3	6.1	7.21	10.3
M	1.83	0.79	1.45	10	75	0.2	2.0%	1.4	2000	5%	5.6	7.0	6.57	9.5
N	0.74	0.79	0.58	10	75	0.2	2.0%	1.4	950	2%	4.4	5.8	7.42	4.3
O	0.58	0.41	0.24	220	70	2.2	1.0%	10.4	350	8%	1.0	11.4	4.80	1.1
OS1	2.91	0.35	1.02	300	100	38	12.7%	5.8	300	5%	0.4	6.2	7.12	7.2
OS2	4.75	0.79	3.75	50	75	1	2.0%	3.1	650	7%	1.0	5.0	8.17	30.6
OS3	2.57	0.41	1.05	300	100	42	14.0%	5.2	200	6%	0.2	5.4	7.82	8.2
OS4	6.25	0.41	2.56	400	100	48	12.0%	5.4	250	3%	0.6	6.0	7.24	18.6
E1	4.32	0.41	1.77	450	100	90	20.0%	4.6	150	1%	0.4	5.0	8.17	14.5
E2	9.44	0.41	3.87	1,200	100	120	10.0%	5.8	0	1%	0	5.8	7.45	28.8
E3	7.07	0.41	2.90	450	100	45	10.0%	5.8	1200	10%	1.6	7.4	6.36	18.4
E4	0.49	0.79	0.39	10	75	0.02	0.2%	8.3	650	2%	3.4	11.7	4.73	1.8
E5	0.09	0.79	0.07	10	75	0.02	0.2%	8.3	0	1%	0	8.3	5.91	0.4
E6	3.65	0.41	1.50	150	70	1.5	1.0%	10.4	600	16%	0.5	10.9	4.94	7.4

Table 3.1 Rational Method Data for Water Quality Flows For Drainage Insert drainage basins

NODE/BASIN	C	I	AREA	Q_{WQ}
		in/hr	acres	cfs
D	.41	0.20	1.93	0.16
E	.41	0.20	1.72	0.14

"C" Using Undeveloped Characteristics, Soil Type C
"I" Using San Diego County 0.2 in/hr for BMP's

A detailed description of the drainage patterns and flows are discussed in the Drainage Report submitted to the County of San Diego along with this SWMP.

Looking at the drainage inserts proposed in Appendix 1 – Treatment control BMP's and using drainage insert Model #4130, the flow rates that can be handled by this model are 942.7 gpm or 2.1 cfs. Adding the proposed basins D&E together (See Table 3.1), the total Water Quality Flow is 0.30 cfs, which is less than the capacity of 2.1 cfs for Model #4130 being proposed.

3.2 Post-Construction Expected Discharges

There are no sampling data available for the existing site condition. In addition, the project is not expected to generate significant amounts of non-visible pollutants. However, the following constituents are commonly found on similar developments and could affect water quality:

Sediment discharge due to landscaped areas that have not been fully established.

Nutrients from fertilizers.

Trash and debris deposited in drain inlets.

Hydrocarbons from paved areas.

Pesticides from landscaping and home use.

3.3 Soil Characteristics

The project area consists of soil group D. The project will not have slopes steeper than 1.5:1. All slopes will include slope protection for construction and post-construction.

*(**Note:** Information regarding soil conditions is also available in the Soil Survey, San Diego Area, California, US Department of Agriculture, 1973.)*

4.0 MITIGATION MEASURES TO PROTECT WATER QUALITY

To address water quality for the project, BMPs will be implemented during construction and post-construction.

4.1 Construction BMPs

A detailed description of the construction BMPs will be developed during the Grading Plan and Improvement Plan Engineering. Since the project is in the preliminary development phase only a listing of potential types of temporary BMPs are available. This includes the following:

- Silt Fence
- Fiber Rolls
- Street Sweeping and Vacuuming
- Storm Drain Inlet Protection
- Stockpile Management
- Solid Waste Management
- Stabilized Construction Entrance/Exit
- Dewatering Operations
- Vehicle and Equipment Maintenance areas
- Desilting Basin
- Gravel Bag Berm
- Sandbag Barrier
- Material Delivery and Storage
- Spill Prevention and Control
- Concrete Waste Management
- Water Conservation Practices
- Paving and Grinding Operations
- Permanent Revegetation of All disturbed uncovered areas
- Erosion Control Mats and Spray-on Applications

Construction BMPs for this project will be selected, constructed, and maintained so as to comply with all applicable ordinances and guidance documents.

4.2 Post-construction BMPs

Pollutants of concern as noted in section 3 will be addressed through three types of BMPs. These types of BMPs are site design, source control and treatment control.

4.2.1 Site Design BMPs

The project is designed to minimize the use of impervious areas. Only approximately 16% of the entire site will be impervious. Streets have been designed to meet the minimum widths. Landscaping of the slopes and common areas will be incorporated into the plans for all slopes greater than 15' in height. All other slopes will be hydro seeded per the County standard. The landscaping will consist of both native and non-native plants. The goal is to achieve plant establishment expeditiously to reduce erosion. The irrigation system for these landscaped areas will be monitored to reduce over irrigation. Also, riprap will be placed at storm drain outfalls to reduce velocities.

4.2.2 Source Control BMPs

Source control BMPs will consist of measures to prevent polluted runoff. This program will include an educational component directed at each homeowner. The homeowners will receive a set of brochures developed by the County's Environmental Health Department. These will include the following:

- Stormwater Runoff Pollution Fact Sheet;
- Stormwater Runoff Pollution Prevention Tips for Homeowners;
- Stormwater Pollution Prevention Yard Work (Landscaping, Gardening, Pest Control);

Stormwater Pollution Prevention Pet Waste; and

- Stormwater BMP Swimming Pool and Spa Cleaning.

In addition, storm drain inlets will be stenciled with a message warning citizens not to dump pollutants into the drains.

4.2.3 Treatment Control BMPs

The following treatment control BMPs will be implemented to address water quality:

- Back yard Grass Swales (bio-swales).
- Hydro-Cartridge filtration system

Placements of the BMPs are noted on the BMP project plan (Attachment C).

4.2.3.1 Grass swales

Swales are vegetated (grass) channels that receive directed flow and convey storm water. These swales are designed to trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce flow velocity. Grass swales can serve as part of a storm water drainage system and can replace regular ditches. Some pollutants are removed by filtration through the grass, sedimentation, adsorption to soil particles, and infiltration through the soil. Swales and strips are mainly effective at removing debris and solid particles, although some dissolved constituents are removed by adsorption onto the soil.

4.2.3.1.1 Appropriate Applications and Siting Constraints

Grass swales can be applied in most situations should be considered wherever site conditions and climate allow vegetation to be established and where flow velocities are not high enough to cause scour. Even where strips cannot be sited to accept directed sheet flow, vegetated areas provide treatment of rainfall and reduce the overall impervious surface. The best application of a grassed swale is as ***pretreatment*** to other structural storm water practices.

Table 3.3.1: Summary Of Bio-filtration Design Factors (Grass Swales)

Description	Applications/Siting Constrains	Preliminary Design Factors
Swales are vegetated channels that receive and convey storm water. Treatment Mechanisms: • Filtration through the grass • Sedimentation • Adsorption to soil particles • Infiltration Pollutants removed: • Debris and solid particles • Some dissolved constituents	• Site conditions and climate allow vegetation to be established • Flow velocities not high enough to cause scour	• Swales sized as a conveyance system (per County flood routing and scour procedures) • Swales sized as a conveyance system • Swale water depth as shallow as the site will permit • Vegetation mix appropriate for climates and location

Geometric Design

The basic components of grass swales design include: longitudinal slope, swale cross section, length and roughness. (See attachment C for detail).

Longitudinal Slope is a critical design element that affects the design of the swale and its performance. Appropriate slopes typically range from one percent to six percent however the optimal slope is between one and two percent. Low slopes limit erosion by reducing water velocities and increase pollutant removal by increasing residence time or "contact time" of water in the swale.

The trapezoidal *Swale Cross Section* is the most common because they are the most easily to construct, offer good hydraulic performance, facilitate maintenance and are aesthetically pleasing. Proper *Side Slopes* of 3:1 or flatter are necessary to limit erosion and to allow mowing. The *Bottom Width* should be at a minimum of 2 feet to allow mowing; the *Depth* should be at least four inches deeper than the maximum design flow depth. The *Length* should be a minimum of 25 feet to allow enough residence time, the greater the residence time, the greater the swale's ability to remove pollutants from runoff. The *Roughness* is a critical design element in grass swale performance. Manning's equation is a generally accepted method to quantify uniform flow rates. Manning's equation calculates the average velocity of water in a channel as a function of the channel's slope, hydraulic radius for a particular flow, and the channel roughness.

$V = (1.49\ R^{2/3}\ S^{1/2})/n$

Where

V = Fluid Velocity (ft/s)
R = Hydraulic Radius (ft) $R=A/P_w$
A = Cross-Sectional Area of Flow (ft^2)
P_w = Wetted Perimeter (ft)]
S = Channel Slope
n = Manning's Roughness Coefficient

The roughness coefficient (*n*) indicates how much a material resists to flow. Values for *n* in vegetated swales are typically 0.30 to 0.40 for dense grasses such as Bermuda or creeping lovegrass.

4.2.3.2 *Hydro-cartridge Storm water filtration system*

The Hydro-Cartridge Filtration System basically acts as a small independent clarifier, or separator. The Hydro-Cartridge is far superior in all aspects of BMP insert filtration.

Traps Sediment, Debris, Heavy Metals, and Floating Solids: It does this by precipitating out the sediments from the runoff flows and allows them to settle to the bottom, or, float to the surface of the Hydro-Cartridge filter. The Hydro-Cartridge is designed in such a way that the capacity to capture solids "Can be increased by varying the internal conduit length. These variations are considered according to each of our customer's needs to maximize performance, Vs the concentrations of the sediment and debris in the vicinity.

Traps Hydrocarbons: As the storm water flow enters the Hydro-Cartridge, the hydrocarbon separates, being lighter, it has a tendency to float back up to the surface of the H/C, where our filter pad rest, floating on the surface. As soon as the hydrocarbon makes contact with our pad, the hydrocarbon will be totally, and permanently captured by our Polymer Absorbent Filter Pad as a solid. The Hydro-Cartridge's absorbent pad is made in such a way that it will not become clogged with debris and sediment. This separation factor is what gives the Hydro-Cartridge its "Extended Time Between Services". This Extended Retention Time allows for "Maximum Hydrocarbon Up-Take" compared to the "Coffee Filter" approach of other insert filters. What does the "Coffee Filter" approach mean? The storm water, debris, and hydrocarbon flows into the competitions absorbent material, hopefully trapping the hydrocarbon and sediment during this "One Very Quick Brief Moment, as it flows through it not around its absorbent, with NO Second Chance"! If this type of filter "Does Not" trap these contaminants, during this "One Very Quick, Brief Moment", the contaminants can pass through the filter, allowing contaminated storm water to go on into your storm drain system, and on into our oceans, streams, and lakes!

Emergency Spill Capabilities Minimizing Expensive Clean-Ups:
We want to underline the Hydro-Cartridge's unique environmental, as well as economical importance of being able to completely trap a Hydrocarbon Spill, including sheen, up to 21 gallons, depending on the filter. The amount depends on the size of the Hydro-Cartridge, the storm water vault, and that's "without the use of any absorbent!"

4.2.3.2.1 *Appropriate Applications and Siting Constraints*

Hydro cartridge filters should be considered whenever there are human activity generated trash, debris, and petroleum leaks. All street drainage should be cleaned before it enters a storm drain system and in many cases, a swale will not

handle the flow or velocities without major scouring or because of other constraints. This is the ideal situation to use Hydro cartridge filters inserts in the inlets to clean the water before it enters a natural stream or storm drain system.

Available for many different flat grate inlet types and sizes. Allows for Illegal Discharge Monitoring/Sampling. The Hydro-Cartridge is able to retain liquids and solids that may enter a storm drain structure as a result of illegal discharges. These retained samples can aid environmental crime

Detectives in detecting and prosecuting illegal dischargers. The City of Coral Gables, FL. has had many incidents of illegal discharges into their storm drain structures. In several incidents, public works officials were able to successfully identify and prosecute the illegal dischargers.

Easy "Drop-In" installation in new or old inlet vaults. Inexpensive, simple maintenance and monitoring.

The Hydro-Cartridge's disposable absorbent pad "can be disposed of in a land fill per the California EPA", is approved by the "California Fish and Game", or can be used as fuel in a power plant, with 1% ash.

10 Year Warranty: How many storm water insert filters do you know that have more than even a one-year warranty at most.

5.0 OPERATION AND MAINTENANCE PROGRAM

The operation and maintenance requirements for each type of BMP are contained in the following sections.

5.1 Hydro cartridge filters inserts

The operational and maintenance needs of a Hydro cartridge filters inserts are:

5.1.1 Inspection Frequency

The facility will be inspected and inspection visits will be completely documented:

- The installed devices should be inspected on a regular basis. The frequency of inspection should be based on pollutant loading, amount of debris, leaves, etc., and amount of runoff. Manufacturer recommendations include no less than three inspections per year.

5.1.2 Aesthetic Maintenance

- Each inspection of the installed filtration systems should include broom sweeping the area around the inlet, removal of the inlet grate, removal of trash and debris and visual inspection of the filter and its installed material

- Vehicle parking lots, corporation yards, and so forth should be swept on a regular basis. Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, should be collected and removed. The frequency of sweeping should be based on the amount of sediment and debris generated.

5.1.2.1 Functional Maintenance.

Manufacturer guidelines for timing of inspections are:

- For areas with a definite rainy season: Prior to and during the rainy season.
- For areas subject to year-round rainfall: On a recurring basis. (Preferably scheduled)
- For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
- For filters not subject to the elements (wash racks, parking garages, etc.), inspections should be on a regular basis.

5.1.2.2 Preventive Maintenance.

While the design of the various models of the Hydro cartridge differs, the basic procedures for the preventive inspection are similar.

- Broom sweep around the inlet and remove the inlet grate.

- Inspect the filter liner for serviceability. If called for, the filter body should be replaced.

- Check the condition of the adsorbent materials and visually check the condition of the enclosed adsorbent. If the surface of the granules is more than 50% coated with a dark gray or black substance, the pouches should be replaced with new ones.

- Check for loose or missing nuts (on some models) and gaps between the filter and the inlet wall, which would allow bypass of the filter during low flows.

- The filter components should be replaced in the inlet and the grate replaced.

5.1.2.3 Corrective Maintenance.

Remove storm drain grate.

- Observe the Hydro Cartridge filter at the top of the system if saturated with oil remove and replace into a dot approve drum or container.

- Using the pipe adapter attached to the suction hose of a pump out truck, insert the extractor pipe to the bottom of the hydro cartridge and begin sucking out the solids and water into the pump out truck until removed.

- (optional) fill the system with water.

- Attach a new hydro cartridge filter to the lifting hooks using plastic zip ties. Only the specially designed, tested and approved filters from advance aquatic products should be utilized for maximum efficiency and safety.

5.1.3 Maintenance Frequency.

Estimated Hydro-Cartridge life is **15 to 25 years**. This factor makes the Hydro-Cartridge extremely cost effective over the long run, compared to the relative short life of the competitions filters.

The hydro cartridge is very easily monitored and maintained by normal personnel. Depending on the location of the system the frequency of maintenance visits is a factor of the surrounding area. During regular visits to the site, a measurement of the solids level can be performed using a calibrated rod that is inserted through the storm drain grate to the bottom of the system. When solids have reached a point that they begin to block the flow of water the system is ready for cleaning operation.

5.1.4 Hazardous wastes.

Note: As the generator, the landowner is ultimately responsible for the proper disposal of all materials collected and exposed adsorbent.

The collected debris and the exposed adsorbent, which should be placed in DOT approved drums, with proper handling and documentation, can usually be disposed of at a landfill. However, because disposal regulations vary by area, it is recommended that the persons disposing of the material contact their local regulatory agency and landfill to ensure compliance with local and state environmental regulations.

5.2 Grass swales

The operational and maintenance needs of a Swale are:

- Vegetation management to maintain adequate hydraulic functioning and to limit habitat for disease-carrying animals.
- Periodic sediment removal to optimize performance.
- Trash, debris and grass trimmings to prevent obstruction of a Swale and monitoring equipment.
- Removal of standing water, which may contribute to the development of aquatic plant communities or mosquito breeding areas.

5.2.1 Inspection Frequency

- Once a month at a minimum.
- After every large storm (after every storm monitored or those storms with more than 0.50 inch of precipitation.)
- On a weekly basis during extended periods of wet weather.

5.2.2 Aesthetic and Functional Maintenance

Functional maintenance is important for performance and safety reasons. Aesthetic maintenance is important for public acceptance of stormwater facilities.

5.2.2.1 *Aesthetic Maintenance*

The following activities will be included in the aesthetic maintenance program:

- Grass Trimming. Trimming of grass will be done on the swale, around fences, at the inlet and outlet structures, and sampling structures.
- Weed Control. Weeds will be removed through mechanical means. Herbicide will not be used because these chemicals may impact the water quality monitoring.

5.2.2.2 *Functional Maintenance*

Functional maintenance has two components: Preventive maintenance and Corrective maintenance.

5.2.2.2.1 Preventive Maintenance

Preventive maintenance activities to be instituted at a Swale are:

- Grass Mowing. Vegetation seed mix (Bermuda grass or similar) within the Swale is designed to be kept short to maintain adequate hydraulic functioning and to limit the development of faunal habitats.
- Trash and Debris. During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.

- Sediment Removal. Sediment accumulation, as part of the operation and maintenance program at a Swale, will be monitored once a month during the dry season, after every large storm (0.50 inch), and monthly during the wet season. Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment will be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the Swale to design performance standards. Actions will include using additional fill and vegetation and/or removing accumulated sediment to correct channeling or ponding. Characterization and Appropriate disposal of sediment will comply with applicable local, county, state, or federal requirements. The swale will be regraded, if the flow gradient has changed, and then replanted with sod.

- Removal of Standing Water. Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.
- Fertilization and Irrigation. The vegetation seed mix (Bermuda grass or similar) has been designed so that fertilization and irrigation is not necessary. Fertilizers and irrigation will not be used to maintain the vegetation.
- Elimination of Mosquito Breeding Habitats. The most effective mosquito control program is one that eliminates potential breeding habitats.

5.2.2.2.2 Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of a Swale. Corrective maintenance activities include:

- Removal of Debris and Sediment. Sediment, debris, and trash, which impede the hydraulic functioning of a Swale and prevent vegetative growth, will be removed and properly disposed. Temporary arrangements will be made for handling the sediments until a permanent arrangement is made. Vegetation will be re-established after sediment removal.
- Structural Repairs. Once deemed necessary, repairs to structural components of a Swale and its inlet and outlet structures will be done within 10 working days. Qualified individuals (i.e., the designers or contractors) will conduct repairs where structural damage has occurred.
- Embankment and Slope Repairs. Once deemed necessary, damage to the embankments and slopes of Swales will be repaired within 10 working days).
- Erosion Repair. Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance of a Swale. There are a number of corrective actions than can be taken. These include erosion control blankets, riprap, sodding, or reduced flow through the area. Designers or contractors will be consulted to address erosion problems if the solution is not evident..
- General Facility Maintenance. In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and its associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

5.2.3 MAINTENANCE FREQUENCY

Maintenance of vegetative swales primarily involves maintenance of the grass cover. Slopes should be inspected for erosion or rills or gullies on an annual basis (semi-annual first year). The maintenance program can be part of the regular landscape maintenance of the site, administered by the responsible party.

5.3 MAINTENANCE AGREEMENT

The County of San Diego will provide the developer with the PRIVATE STORM WATER TREATMENT MAINTENANCE AGREEMENT form for recordation. (This obligation would be passed on to future purchasers or successors of the landowner, as a covenant).

The proposed project will constitute a "Common Interest Development" which will include membership in or ownership of an "Association" as defined in California Civil Code Section 1351(a). Certain private storm water treatment facilities will be managed and controlled by the Association.

Grass swales:

-Swales shall be the responsibility of the individual property owners. It is the Association responsibility to enforce the maintenance of the back-yard grass swales. In the event the Owner fails to properly maintain these facilities, the Association shall give written notice to the Owner, stating that with particularity the maintenance which the Association finds to be required and requesting that the same be carried out within period of (30) days from the giving of such notice. In the event the Owner fails to carry out such maintenance or repair within the period specified by the notice. The Association shall have the right to cause such work to be completed and in such case the Owner shall have the obligation to reimburse the Association within thirty (30) days after presentation of a statement thereof.

-Property access rights will be granted to the Association for inspection and maintenance in a "back-up" role in the event owners fails to maintain the swales.

Hydro cartridge filters inserts:

-It is the Association responsibility to maintain these facilities in accordance to this report. In the event the Association fails to properly maintain these facilities, the Declarant (i.e. City Inspector) shall give written notice to the Association, stating that with particularity the maintenance which the Declarant finds to be required and requesting that the same be carried out within period of (30) days from the giving of such notice. In the event the Association fails to carry out such maintenance or repair within the period specified by the notice. The Declarant shall have the right to seek civil action, criminal action or administrative citation for violations of the agreement.

-Property access rights will be granted to the Association for inspection and maintenance of the drainage inserts.

6.0 FISCAL RESOURCES

The maintenance of the treatment BMP's for the site will be the responsibility of the current property owner.

The Association shall repair and maintain the drainage inserts, the costs shall be assessed against each owner proportional to his/her subdivision interest in the property. This second category BMP, and the maintenance Program and estimated cost of this maintenance program can be found in attachments *D and E*, respectively.
The biofiltration swales and riprap are considered Category one BMP's and are not listed in the maintenance program and costs.

7.0 SUMMARY/CONCLUSIONS

This SWMP has been prepared in accordance with the Watershed Protection, Stormwater Management, and Discharge Control Ordinance and the Stormwater Standards Manual. This SWMP has evaluated and addressed the potential pollutants associated with this project and their effects on water quality. A summary of the facts and findings associated with this project and the measures addressed by this SWMP is as follows:

- The beneficial uses for the receiving waters have been identified. None of these beneficial uses will be impaired or diminish due to the construction and operation of this project.
- The Homeland Estates project will not significantly alter drainage patterns on the site. The discharge points will not be changed.
- Open areas and slopes will be landscaped to reduce or eliminate sediment discharge.
- Drainage Inserts will be used as a BMP in the streets to prevent pollution from urban runoff and grassy swales to prevent pollution from street pads.
- The proposed construction and post-construction BMPs address mitigation measures to protect water quality and protection of water quality objectives and beneficial uses to the maximum extent practicable.

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Frank Florez

FRANK FLOREZ
REGISTERED CIVIL ENGINEER

7-20-05

DATE

APPENDIX 1

TREATMENT CONTROL BMP'S

ATTACHMENT G-3

Enhanced Treatment Control BMP Selection Matrix

Pollutant of Concern	*Treatment Control BMP Categories*						
	Biofilters	Detention Basins	Infiltration Basins[2]	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Continuous Flow Deflection Systems[3]
Sediment	M	H	H	H	M	H	M
Nutrients	L	M	M	M	M	M	L
Heavy Metals	M	M	M	H	M	H	L
Organic Compounds	U	U	U	U	L	M	L
Trash & Debris	L	H	U	U	M	H	M
Oxygen Demanding Substances	L	M	M	M	L	M	L
Bacteria	U	U	H	U	L	M	L
Oil & Grease	M	M	U	U	L	H	L
Pesticides	U	U	U	U	L	U	L

(1) The County will periodically assess the performance characteristics of many of these BMPs to update this table.

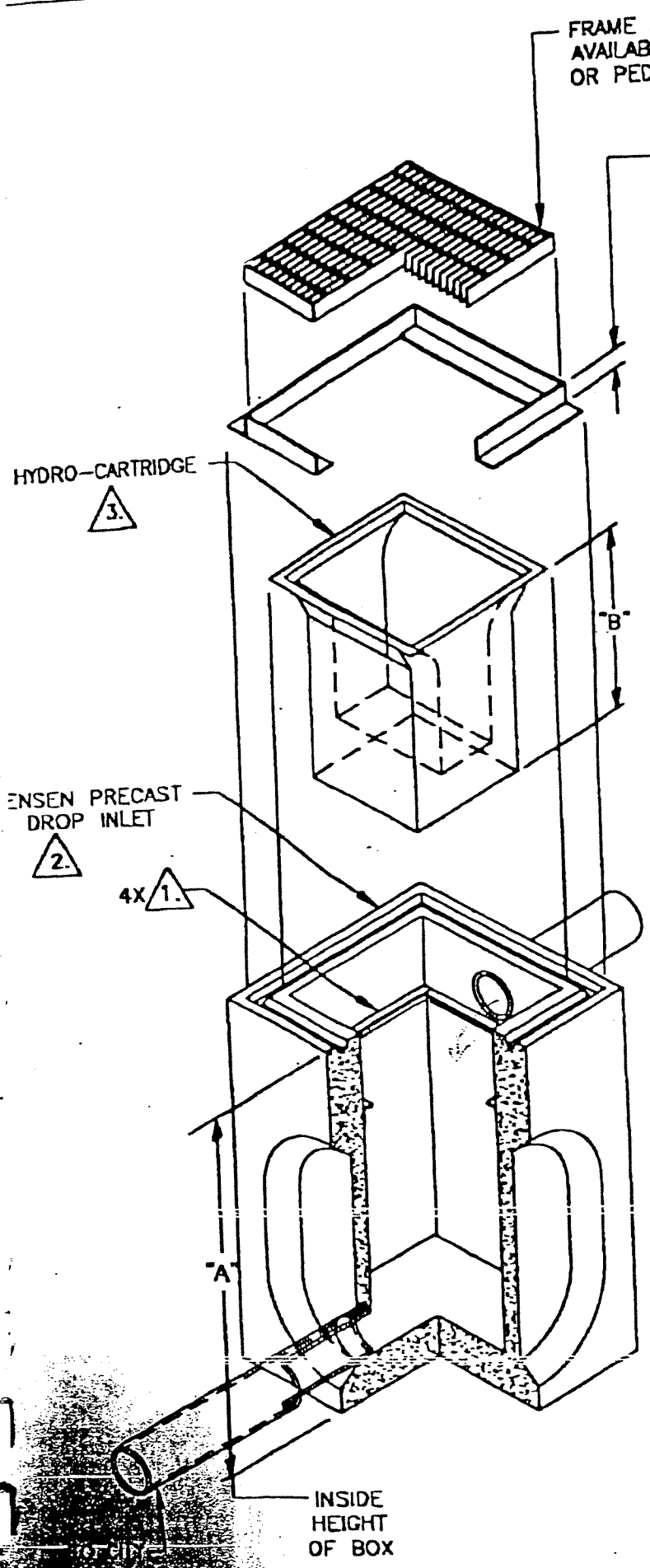
(2) Including trenches and porous pavement.

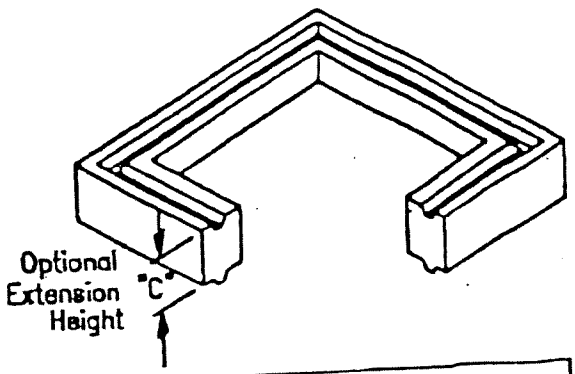
(3) Also known as hydrodynamic devices and baffle boxes.

L (Low): Low removal efficiency
M (Medium): Medium removal efficiency
H (High): High removal efficiency
U: Unknown removal efficiency, applicant must provide evidence supporting use

Sources: *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (1993), *National Stormwater Best Management Practices Database* (2001), and *Guide for BMP Selection in Urban Developed Areas* (2001).

These are the Treatment control BMP's to be used.





Jensen Extension Ring		
Jensen No.	"C"	Weight
RS242406	6"	300bs.
RS242412	12"	600bs.

Jensen 24" Drop Inlet with Hydro-Cartridge Filter			
Jensen No.*	"A"	"B"	H/C Part No.*
DI242436	30"	23"	4130-S
DI242448	36"	30"	4130-M *

* Preffered

4. BOX DESIGN LOAD: H-20 (TRAFFIC)

3. FOR HYDRO-CARTRIDGE STORM WATER FILTER SPECS., CALL STORM WATER SYS., SALES: 714-734-8419

2. FOR COMPLETE VAULT DESIGN AND PRODUCT INFORMATION, CONTACT: JENSEN PRECAST, FONTANA, CA. SALES: 909-429-4127

1. INSTALL 1" X 4" WIDE ANGLE IRON SUPPORT FRAME, BELOW TOP EDGE OF DROP INLET TO ALL FOUR WALLS.

Storm Water Systems		
Title: 24" DROP INLET FILTRATION SYSTEM, W/ DRAIN PIPE, FLOWS TO STORM DRAIN		
DRW NO.: 2003-02-04	Scale: None	Rev. A

Storm Water Systems

The West Coast Home of the Hydro-Cartridge
18612 Saugus Ave. Santa Ana, CA 92705
(714) 734-8419 FAX (714) 505-2188

Hydro-Cartridge Sizes and Pricing Schedule

As of 8/30/2002

Note: * Preferred Hydro-Cartridge Configuration
** Standard Support Lip Dimensions. For Lip Dimensions other than Standard, add $100.00.

H/C Model #	Length Dash Ltr.	Grate Dim.	Shape	Depth Note	Flow Rates GPM	Spill Holding Capacity	Price per Unit
4102 -	S	14" x 25" **	Rect.	22"	360	2.4 Gals.	$815.00
4102 -	M *	To	Rect.	30"	360	7 Gals.	$815.00
---	L	16" x 27"	---	---	---	---	---
4105 -	S	18" x 28" **	Rect.	22"	871.7	4 Gals.	$865.00
4105 -	M	To	Rect.	30"	871.7	12 Gals.	$865.00
4105 -	L *	22" x 34"	Rect.	42"	871.7	20 Gals.	$865.00
---	S	24" x 36" **	---	---	---	---	---
4120 -	M *	To	Rect.	29.4"	2,959.7	21 Gals.	$915.00
---	L	27" x 42"	---	---	---	---	---
4120LA -	M *	25 3/8" x 40 3/8"	Rect.	29.4"	2,959.7	21Gals.	$1,020.00
---	S	28" x 36" **	---	---	---	---	---
4155 -	M *	To	Rect.	31"	1,278	13 Gals	$915
---	L	34" x 42"	---	---	---	---	---
---	S	28" x 34" **	Rect.	---	---	---	---
---	M	To	Heavy	---	---	---	---
9130 -	L *	34" x 40"	Duty	42"	1,862.4	16 Gals.	$1,099.00
---	S	35" x 46" **	---	---	---	---	---
Type "F" -	M *	To	Rect.	31"	3,514.3	20 Gals.	$1,599.00
---	L	36" x 50"	---	---	---	---	---
---	S	40" x 53" **	---	---	---	---	---
Type "E" -	M *	To	Rect.	38"	3,514.3	20 Gals.	$1,799.00
---	L	44" x 58"	---	---	---	---	---
4605 -	S	18" x 18" **	Square	22"	766.5	3 Gals.	$815.00
---	M	To	---	---	---	---	---
---	L	23" x 23"	---	---	---	---	---

* → 2.10 cfs

H/C Model #	Length S, M, L	Grate Dim.	Shape	Depth Note*	Flow Rates GPM	Spill Holding Capacity	Price per Unit
* 4130 -	S	24" x 24" **	Square	23"	942.7	4 Gals.	$865.00
4130 -	M *	To	Square	30"	942.7	13 Gals.	$865.00
—	L	29" x 29"	—	—	—	—.	—
4608 -	S	26" x 26" **	Square	23"	942.7	4 Gals.	$865.00
4608 -	M *	To	Square	31"	942.7	13 Gals.	$865.00
—	L	26" x 26"	—	—	—	—	—
—	S	30" x 30" **	—	—	—	—	—
4170 -	M *	To	Square	31"	2,295.8	17 Gals.	$915.00
—	L	39" x 39"	—	—	—	—	—
9150 -	S	29" x 29" **	Square	23'	942.7	4 Gals.	$915.00
9150 -	M *	To	Heavy	31"	942.7	13 Gals.	$915.00
	L	29" x 29"	Duty	—	—	—	—
—	S	—	Square	—	—	—	—
9151 -	M	29" x 58" **	Heavy	31"	3,514.0	20 Gals.	$1, 999.00
—	L	—	Duty	—	—	—	—
—	S	16" Dia. **	—	—	—	—	—
3115 -	M	To	Round	25"	415.3	6 Gals.	$815.00
3115 -	L	28" Dia.	Round	36"	—	9 Gals.	$815.00
—	S	23" Dia **	—	—	—	—	—
3600 -	M	To	Round	27"	—	6 Gals.	$865.00
3600 -	L	24" Dia..	Round	38"	—	9 Gals.	$865.00
3120 -	S	25" Dia.. **	Round	25"	—	6 Gals.	—
3120 -	M	To	Round	36"	—	9 Gals.	—
—	L	25" Dia...	—	—	—	—	—
3650 -	S	23" Dia **	Round	25"	—	6 Gals.	$825.00
3650 -	M	To	Round	36"	—	9 Gals.	$825.00
—	L	24" Dia. **	—	—	—	—	—
—	S	15" Dia. **	Auger	—	—	—	—
4102 -	M	To	Hole.	26"	—	9 Gals.	$815.00
—	L	18" Dia.	No Struct.	—	—	—	—
—	S	—	Auger	—	—	—	—
4105 -	M	24" Dia..	Hole	30"	—	11 Gals.	$865.00
—	L	—	No Struct.	—	—	—	—

Description & Features

The **Hydro-Cartridge**[R] is a patented fiberplastic pollution-control system designed to retrofit existing stormwater drains of various dimensions and shapes. **Its purpose is to intercept the various solid and liquid components commonly found in stormwater runoff flows.** It will prevent these pollutants from entering the stormwater discharge and elimination systems which flow into retention ponds, waterways, lakes and oceans.

The Hydro-Cartridge[R] **possesses several very beneficial features. It will:**

1) **Trap solids** such as silt, rocks and other heavier than water substances that routinely enter stormdrains during rainfall events or other activities, such as construction or street sweeping. Many of these sediments have been proven to contain pollutants such as heavy metals.

2) **Trap a variety of petroleum hydrocarbon liquids** that also flow routinely into stormdrains during rainfall events or during emergency spills onto roadways. A specially designed Hydro-Cartridge Petroleum Filter™ absorbs liquid petroleum and locks it up permanently in a cross-linked polymer matrix. This effectively transforms these hazardous hydrocarbons into a benign, rubberized solid that is easy and safe to both handle and dispose. This material exceeds all current EPA and California (USA) environmental standards for absorbents.

3) **Hold spills of a solid or liquid nature in the event of an emergency** such as a drum rupture or fuel tank leak. Depending on the particular model of Hydro-Cartridge[R] used, a volume from 10 gallons to over 50 gallons will be held thus preventing an unwanted flow of solid or liquid material into the stormdrain system.

4) **Provide simple and cost-effective retrofitting** for the many stormdrains in use by cities and industries required to address NPDES, CZARA & CWA regulations.

5) **Allow monitoring** of stormwater pollutants and can aid illegal discharge detection of both solid and liquid materials

6) **Allow for fast and easy maintenance** by existing general maintenance personnel or from third party contractors licensed to handle hazardous wastes.

Nomenclature

The Hydro-Cartridge[R] is designed to be compatible with the variety of standard stormdrain grate systems used in the past, currently in use and contemplated in the future. The majority of basic designs are either rectangular, square or circular with numerous aspect ratios in the United States and elsewhere. This makes the possible combination of different designs quite staggering, but the Hydro-Cartridge[R] is able to fit the majority of systems in use through clever design features and adapting plates.

To assist with the selection of the correct Hydro-Cartridge[R] model, the model number matches the standard manufacturing code numbers that are generally stamped into the grate during manufacture. Most areas of the country have a majority of stormdrain grates from one or two local suppliers of cast iron products. Therefor, in each state or region where a primary manufacturer or supplier is identified, the use of their particular grate code will also be the same as the Hydro-Cartridge[R] model specified for that grate. Exceptions will be noted by us.

For example, a standard rectangular drain size in South Florida is 14" x 25". Most of the stormdrains in this region are manufactured by the local company, U.S. Precast. Their

number for the grate to fit this stormdrain is known by the code number "4102." Therefor, a city engineer would specify a "Hydro-Cartridge[R] Model 4102" for a unit that properly fits this particular size of stormdrain grate.

In all cases, the suffix of **S**, **M** or **L** designates the unit's depth (e.g. 4102 L or 4105 S). A Small unit is for vaults 18" deep; Medium is up to 30" deep; Large is up to 40" deep. The depth of the Hydro-Cartridge[R] affects the capacity of the system when retaining liquid spills and is generally sized by the available depth of the stormdrain structure. In general, the deeper the Hydro-Cartridge[R] used the better its ability to separate lighter density liquids, i.e. liquid petroleum runoff will tend to stay on the surface of the inlet area since it must travel through a longer column of water to be discharged into the stormdrain structure. Also, the greater the depth the greater the emergency holding capacity of the system during emergency spill events. Finally, the greater the depth of the system used the greater the solid holding capacity also. This can affect the periodicity of the maintenance required to keep the system operating at top efficiency; i.e. with a greater holding capacity the deeper systems will not need to be cleaned as often.

Mechanism of Operation

The Hydro-Cartridge[R] is designed with simple but effective operating characteristics that allow it to perform several functions with regard to NPDES management. By utilizing natural principles of material physics a large amount of the runoff solids and liquids can be effectively trapped and held for later removal.

When stormwater flows enter the input of the Hydro-Cartridge[R] system water is usually already present due to the design which acts like a trap. This causes flows of solids to slow down immediately and suspends the solids within the flow. Liquids of different density, like most petroleum hydrocarbons, will begin to float to the surface. In the case of faster flows of stormwater, most of the low density liquids will suspend in the upper portion of the system allowing the higher density water to pass by and eventually discharge into the stormdrain structure. During very high volume flows some emulsification of the light density liquids will occur. Solids will begin to eventually precipitate out of the flow and settle at the bottom of the Hydro-Cartridge[R]. The flow of the water then changes direction and flows up both sides of the system, away from the center core where the flows came from originally. This side flow eventually discharges toward the top and sides of the system and into the stormdrain structure. At the entrance to the system, the Hydro-Cartridge Filter™ attracts the liquids of lighter density i.e. the petroleum hydrocarbons that flow from the roadway surface. The

material in the filter is designed to capture and hold permanently any petroleum hydrocarbons that may be in the stormwater flow. During high volume flows of stormwater, the filter is less effective than when the flow of stormwater goes to zero. When no flow is going into the system the ability of the liquids of differing density to separate is increased. This causes the petroleum hydrocarbon portion of the flow to separate out and float on the surface in direct contact with the Hydrocartridge Filter™. The capture time for the filter is from a few seconds for lighter hydrocarbons, such as gasoline, up to a minute or so for heavier hydrocarbons, such as oil.

In case of a large release of liquid contaminates that find their way into stormdrains fitted with the Hydro-Cartridge® system another design feature becomes apparent. The system is able to hold a relatively large capacity (over 40 gallons in some cases) of solids and/or liquids that occur during a spill onto the roadway. This will prevent undesirable flows of contaminates into the stormdrain structure and associated distribution and discharge pipes. This facilitates cleanup of the spilled contaminates and prevents a costly cleaning process of the underground structure and pipes. The Hydro-Cartridge® is a very effective first line of defense when dealing with potential leaks and associated flows to stormdrains for all types of situations. Because of its fiberplastic construction, the system is able to withstand exposure to a wide range of liquid contaminates including acids and strong solvents such as TCE or Benzene. Additionally, the Hydro-Cartridge® will hold high density contaminates, such as

concrete, safely and will not cause buckling or collapse of the system while preventing their flow into the stormdrain structure.

Installation Procedure

Installation of the Hydro-Cartridge[R] is simple and straightforward. Generally, one person is able to handle all aspects of installation and a minimum of equipment is required. The general procedure is outlined as follows:

1) Remove the grate to the stormdrain structure.
2) Use a wire brush to clean rocks and dirt from the grate frame.
3) Insert the Hydro-Cartridge[R] into the structure so it hangs on the frame.
4) Install a Hydrocartridge Filter™ with plastic zip ties to the lifting hooks.
5) Reset the grate onto the grate frame.
6) (Optional) Fill the Hydro-Cartridge[R] with water.

The entire procedure will take less than 5 minutes to complete in most cases. In the case of large stormdrain structures, such as those commonly found at airports, it may require two persons to remove the grate. Step 6 is optional but helps the system to work immediately to capture petroleum hydrocarbons. Without water in the system initially, the system will first fill up with water thereby allowing only minimal contact of the water/petroleum layer with the filter. Preloading with water prevents the possibility of hydrocarbons flowing into the drain.

Maintenance Procedure

The Hydro-Cartridge[R] is very easily monitored and maintained by normal maintenance personnel. Depending on the location of the system the frequency of maintenance visits is a factor of the surrounding area. For example, a system installed next to a vehicle maintenance area will generally require cleaning and filter replacement more often than a system installed at a suburban setting. Therefor, a maintenance record should be kept not only to prove the system has been properly maintained but to also help determine the frequency of visits to keep the system operating at top efficiency. An example of such a record is provided in the attachment section.

The maintenance of the Hydro-Cartridge[R] system is uncomplicated and easily performed by one maintenance person. During regular visits to the site, a measurement of the solids level can be performed using a calibrated rod that is inserted through the storm grate to the bottom of the system. When the solids have reached a point that they begin to block the flow of water the system is ready for a cleaning operation. The procedure is as follows:

1) Remove the stormdrain grate.

2) Observe the Hydro-Cartridge Filter at the top of the system. If saturated with oil remove and place into a DOT approved drum or container.

3) Using the pipe adapter attached to the suction hose of a pump out truck, insert the extractor pipe to the bottom of the Hydro-Cartridge[R] and begin sucking out the solids and water into the pump out truck until removed.

4) (Optional) Fill the system with water.

5) Attach a new Hydro-Cartridge Filter to the lifting hooks using plastic zip ties. Only the specially designed, tested and approved filters from Advanced Aquatic Products should be utilized for maximum efficiency and safety. Use of any other will void any manufacturer warranties.

6) Reinstall the stormdrain grate.

As previously noted, a maintenance record should be filled out to help track activity at each site and to prove the proper maintenance has been performed to the satisfaction of local regulatory agency personnel. Records can also act as evidence in cases where illegal discharges or dumping has been observed. Accurate records can also aid detection of pollution problems that were unanticipated. In cases where monitoring is required, samples of the solids and the filter should be kept and properly labeled for future analysis by a laboratory. This could aid DEP enforcement officials in locating the source of illegal pollutant discharges and the prevention of illegal dumping into the stormdrain system.

Handling of Wastes—Sediments

Currently, there are no laws governing the specifics of stormdrain waste handling. Studies have shown that a number of pollutants, especially heavy metals, are contained in the solids found in stormdrains. As NPDES evolves it is anticipated that greater scrutiny will occur with regard to the handling and disposition of stormwater runoff wastes. As such, we believe that all wastes coming from the use of the Hydro-Cartridge[R] should be handled in a responsible

and safe manner since we do have some idea of the contaminates commonly found. We have been recommending that the label "Uncharacterized Wastes" be used on drums or containers that store the solids coming from Hydro-Cartridge[R] maintenance. Until a sample is removed and properly tested by a laboratory it is only conjecture as to what exactly is in the solids removed from the system. The issue of stormwater runoff will become more clear in the future as to the responsibility of proper handling of contaminates. Many issues have yet to be faced, such as the legal aspects of who is ultimately responsible for these contaminants, especially when collected from public areas which the local government is normally responsible to maintain. As we know, a variety of contaminates currently flow into drain systems without monitoring of any type. This is why the NPDES laws were developed.

In general, these solids collected from the system should be handled as a toxic waste solid. It is therefor necessary to store this material in DOT approved drums for proper landfill disposal. Until some other method of disposal or use of the contaminated solids is developed this is the basic procedure necessary to insure that the solids will not contaminate some other site. Just spreading the sediment onto the surface of some piece of land just won't do. It is the basic responsibility of the maintenance contractor to document that proper handling of the solids has been achieved on behalf of the party who is using the Hydro-Cartridge[R] system to meet NPDES guidelines on their property.

Handling of Wastes—Petroleum Hydrocarbon Filters

With regard to the petroleum hydrocarbons collected by the filter we have a straightforward means of dealing with the problem. The filters are composed of a cross-linked copolymer that has tremendous affinity for liquid hydrocarbons (petroleum). This material has been tested under the tradename "Rubberizer" and has over 9 years of use history without incident. The State of California has even allowed landfilling of filters containing PCB oils since the filter is designed to lock in contaminates permanently. When properly incinerated, the "Rubberizer" material by itself only releases water and carbon dioxide (complete combustion). Rubberizer has a built in heat value of approximately 18,000 Btu's per pound, making it an excellent secondary fuel material. For this reason, it is generally safe to incinerate the Hydro-Cartridge^{R} Filters^{TM} after they have been used to collect waste petroleum.

Once the filter has been removed from the Hydro-Cartridge^{R} during regular maintenance it should be placed into a proper storage container such as a DOT approved drum and sealed. The filter will hold the liquid hydrocarbon by transforming the liquid into an easy to deal with solid that will not leach out, even when run over with a truck! For this reason the handling & transportation of the filters is a relatively safe procedure; even if a barrel were to split open after falling off a vehicle, there is little or no chance of any contaminated liquid release. This makes dealing with the disposal of the filters much easier than most common absorbents. No

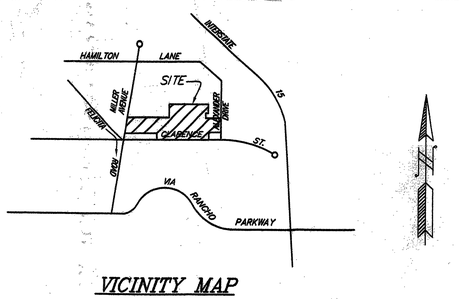
other materials should be used in place of these special filters and any substitutions will void the manufacturer's warranty. These filters have been evaluated in EPA sponsored NPDES testing for over 2 years and are very effective in removing surface contamination of the water to below 10 ppm.

Once the filters have been collected, they may be stored indefinitely and will not evaporate or leach any of the collected petroleum hydrocarbons. In this form we have two options: either landfill the waste filters or incinerate them. We recommend the second option, since there is the opportunity to actually sell the filters as a waste-fuel source. The Btu value of differing petroleum hydrocarbon we have collected is still available in solid form, in addition to the Btu value of the filter itself. By incinerating the filters there is zero chance of future contamination occurring.....ever. And, the filters can be converted into something useful, like electricity, for the good of the community. It becomes a real 'win-win' situation for all concerned.

Hydro-Cartridge^{R} users should consult with an environmental waste handling professional as well as their Local and State environmental regulatory agency when determining the handling procedures and the proper and legal disposal of stormwater discharge-related wastes.

ATTACHMENT A

SITE MAP



VICINITY MAP

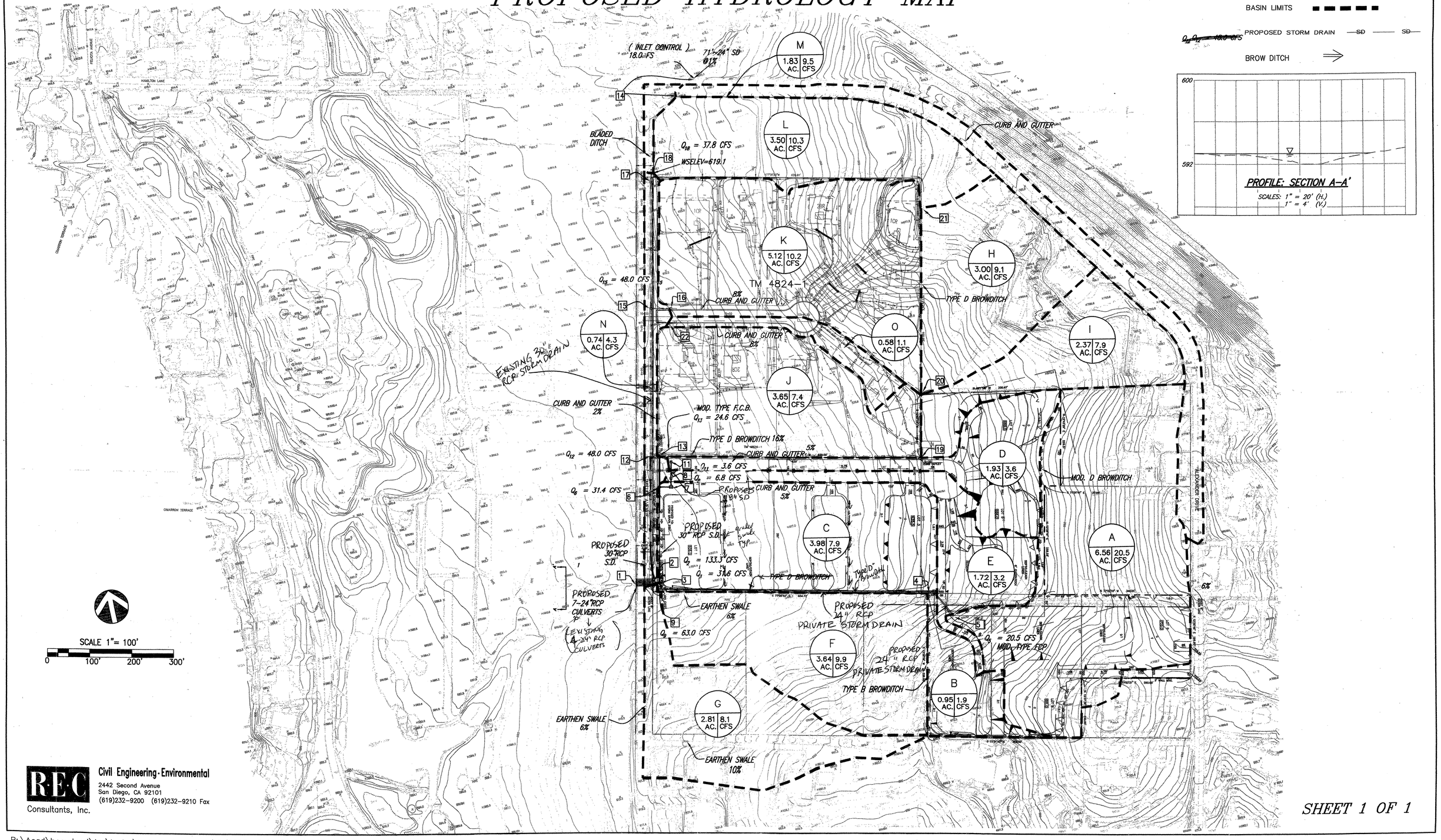
SITE PLAN
HOMELAND ESTATES
COUNTY OF SAN DIEGO

REC Consultants, Inc.
Civil Engineering · Environmental
7445 Mission Valley Road, Suite 109
San Diego, CA 92108
(619)688-0305 (619)294-9394 Fax

ATTACHMENT B

HYDROLOGY MAPS

COUNTY OF SAN DIEGO TRACT 5362
HOMELAND ESTATES
PROPOSED HYDROLOGY MAP



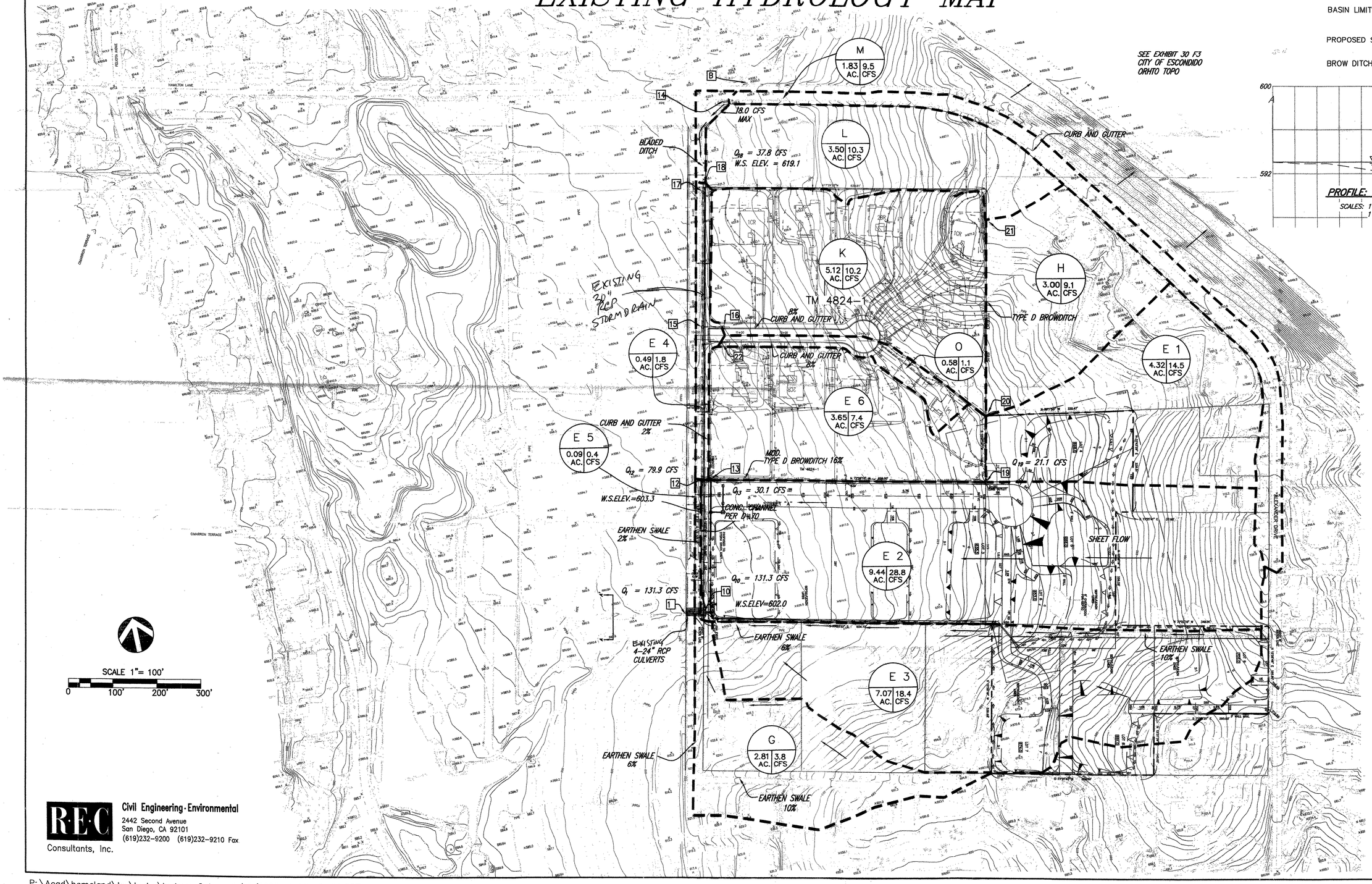
REC Consultants, Inc.
Civil Engineering · Environmental
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

SHEET 1 OF 1

COUNTY TRACT 5362, HYDROLOGY MAP

P:\Acad\homeland\tm\hydro\hydromp1.dwg 2/13/2005 6:04:34 PM PST

COUNTY OF SAN DIEGO TRACT 5362
HOMELAND ESTATES
EXISTING HYDROLOGY MAP



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SHEET 1 OF 2

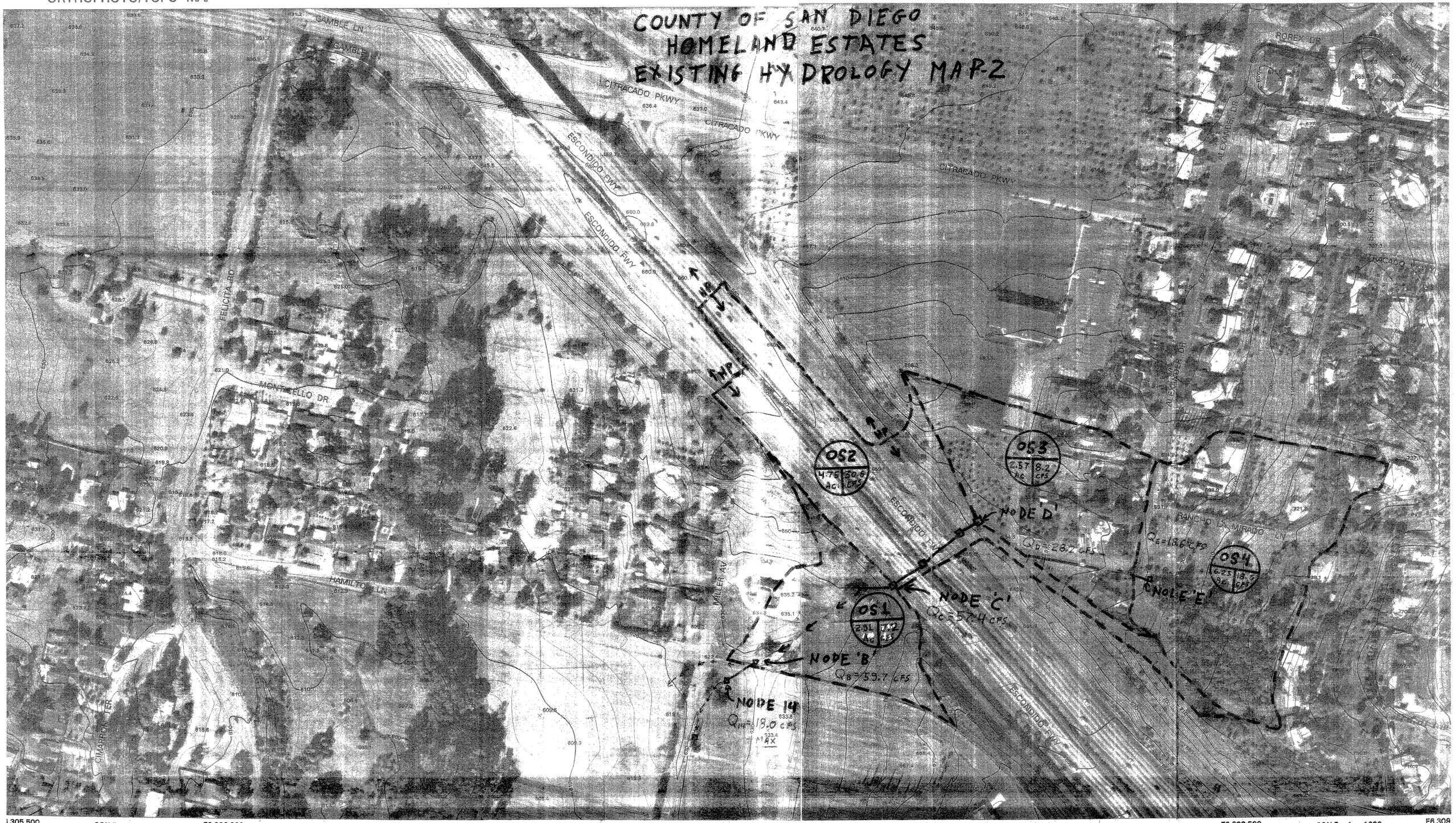
COUNTY TRACT 5362, HYDROLOGY MAP

P:\Acad\homeland\tm\hydro\hydromp2.dwg 2/13/2005 6:06:36 PM PST

CITY OF ESCONDIDO
ORTHOPHOTO/TOPO MAP

CITY OF ESCONDIDO
ORTHOPHOTO/TOPO MAP

COUNTY OF SAN DIEGO
HOMELAND ESTATES
EXISTING HYDROLOGY MAP-2



E6,305,500 E6,306,000 E6,306,500 E6,307,000 E6,307,500 E6,308,000 E6,308,500 E6,309

SCALE 1 : 1200

100 50 0 100 200

CONTOUR INTERVAL 2 FEET
SOUTH AND WEST SHEET MARGIN COORDINATES
ON CALIFORNIA STATE PLANE COORDINATE SYSTEM
NAD 1983

INDEX TO ADJOINING SHEETS

1978-6301	1978-6304	1978-6307
1976-6301	1976-6304	1976-6307
1974-6301	1974-6304	1974-6307

CITY OF ESCONDIDO
STATE OF CALIFORNIA

SHEET 2 OF 2

SCALE 1 : 1200

100 50 0 100 200

CONTOUR INTERVAL 2 FEET
SOUTH AND WEST SHEET MARGIN COORDINATES
ON CALIFORNIA STATE PLANE COORDINATE SYSTEM
NAD 1983

ATTACHMENT C

BMP MAP

PRELIM. GRADING/BMP CONCEPTUAL PLAN (POST BMP'S)
HOMELAND ESTATES
COUNTY OF SAN DIEGO

SCALE 1"= 50'
0 50' 100' 150'

R·E·C Civil Engineering · Environmental
7445 Mission Valley Road, Suite 109
San Diego, CA 92108
(619)688-0305 (619)294-9394 Fax
Consultants, Inc.

POST CONSTRUCTION BMP'S
- DRAINAGE INSERT (PRIVATE) - SEE REPORT FOR DETAILS/SPECS
- GRASSY LINE SWALE BIOFILTER - SEE REPORT FOR DETAILS

SHEET 1 OF 1

ATTACHMENT D

BMP Maintenance Program

SECOND CATEGORY:

The County needs to assure ongoing maintenance. The nature of the proposed BMPs indicates that it is appropriate for property owners to be given primary responsibility for maintenance, on a perpetual basis (unless a stormwater utility is eventually formed). However, the County (in a "backup" role) needs to be able to step in and perform the maintenance if property owner fails, and needs to have security to provide funding for such backup maintenance. Security for "backup" maintenance after the interim period (5 years) would not be provided, however primary owner maintenance responsibility would remain. If a stormwater utility or other permanent mechanism is put into place, it could assume either a primary or backup maintenance role.

Typical BMPs:

- ~~Biofilters (Grass swale, Grass strip, Minor wetland vegetation swale)~~
- Small Detention Basins (Extended/dry detention basin)
- Infiltration BMP (basin, trench)
- Single Storm Drain Inserts, Oil/Water separator, Catch basin insert & screens.

Mechanisms to Assure Maintenance:

1. Stormwater Ordinance Requirement: The County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (S.O.) requires this ongoing maintenance. In the event that the mechanisms below prove ineffective, or in addition to enforcing those mechanisms, civil action, criminal action or administrative citation could also be pursued for violations of the ordinance.

2. Public Nuisance Abatement: Under the S.O. failure to maintain a BMP would constitute a public nuisance, which may be abated under the Uniform Public Nuisance Abatement Procedure. This provides an enforcement mechanism additional to the above, and would allow costs of maintenance to be billed to the owner, a lien placed on the property, and the tax collection process to be used.

3. Notice to Purchasers. Section 67.819(e) of the SO requires developers to provide clear written notification to persons acquiring land upon which a BMP is located, or others assuming a BMP maintenance obligation, of the maintenance duty.

4. Conditions in Ongoing Land Use Permits: For those applications (listed in SO Section 67.804) upon whose approval ongoing conditions may be imposed, a condition will be added which requires the owner of the land upon which the stormwater facility is located to maintain that facility in accordance with the requirements specified in the SMP. Failure to perform maintenance may then be addressed as a violation of the permit, under the ordinance governing that permit process.

5. Subdivision Public Report: Tentative Map and Tentative Parcel Map approvals will be conditioned to require that, prior to approval of a Final or Parcel Map, the subdivider shall provide evidence to the Director of Public Works, that the subdivider has requested the California Department of Real Estate to include in the public report to be issued for the sales of lots within the subdivision, a notification regarding the maintenance requirement. (The requirement for this condition would not be applicable to subdivisions

which are exempt from regulation under the Subdivided Lands Act, or for which no public report will be issued.)

6. BMP Maintenance Agreement with Easement and Covenant: An agreement will be entered into with the County, which will function three ways:

(a) it will commit the land to being used only for purposes of the BMP;

(b) it will include an agreement by the landowner, to maintain the facilities in accordance with the SMP (this obligation would be passed on to future purchasers or successors of the landowner, as a covenant); and

(c) it will include an easement giving the County the right to enter onto the land (and any necessary adjacent land needed for access) to maintain the BMPs.

This would be required of all applications listed in SO Section 67.804. In the case of subdivisions, this easement and covenant would be recorded on or prior to the Final or Parcel Map.

Funding:

Developer would provide the County with SECURITY to back up the maintenance agreement, which would remain in place for an interim period of 5 years. The amount of the security would equal the estimated cost of 2 years of maintenance activities. The security can be a Cash Deposit, Letter of Credit or other form acceptable to the County.

~~THIRD CATEGORY:~~

The County need to assure ongoing maintenance is heightened, to the point that the County is willing to take on this responsibility. A permanent funding mechanism needs to be established.

Typical BMPs:

- Biofilters (Wetland vegetation swale, or Bioretention)
- Detention Basins (Extended/dry detention basin)
- Infiltration BMP (basin, trench)
- Wet Ponds and Wetlands (Permanent pool, Constructed wetland)
- Multiple Storm Drain Inserts, Oil/Water separators, Catch basin insert & screens.
- Filtration Systems (Media filtration, Sand filtration, Continuous Flow Deflection/ Separation System, Swirl or Cyclone Concentrator)

Mechanisms to Assure Maintenance:

1. Dedication of BMP to County: The developer would be required to dedicate the BMP (and the property on which it is located) to the County. This could be an immediate dedication, or for cases where the County would not want to assume responsibility for the facility for some time (e.g., until after construction is completed), then an IOD could be used instead.

MECHANISMS TO ASSURE MAINTENANCE OF STRUCTURAL TREATMENT BMPs

1. **SWMP to Propose Maintenance Mechanisms for All BMPs**; DPW Staff Review Will Assure:
   - BMP selection has taken ongoing maintenance costs into consideration
   - Maintenance regime is described with detail sufficient to enable enforcement
   - Appropriate determination of public / private responsibility, and mechanism(s) (below)
2. **Determination of Appropriate Maintenance Mechanism(s):**

>>>>>>>>>>>>>> Increased risk, complexity, cost or other maintenance factors>>>>>>>>>>>>>>>>				
	(Private Responsibility)		(Public Responsibility)	
	First Category	**Second Category**	**Third Category**	**Fourth Category**
Importance of Maintenance	Minimal concern; inherent in BMP or property stewardship	Need to make sure private owners maintain, and provide County ability to step in & perform maintenance	Warrants Flood Control Dist. (FCD) assuming responsibility, with funding related to project	Broader public responsibility for maintenance and funding (beyond project)
Typical BMPs	Biofilter (Grass swale, grass strip, vegetated buffer); Infiltration basin/trench	[First cat. plus:] Minor wetland swale; ~~Small detention basin;~~ Single storm drain insert / Oil-water separator / Catch basin insert & screen	[Second cat. plus:] Wetland swale or bioretention; Detention basin (extended/dry); Wet ponds & wetlands; Multiple storm drain inserts; Filtration Systems	[Third cat. plus:] Retrofit public storm drain inserts, etc. Master plan facility that serves area larger than project
Mechanisms	1. Stormwater Ordinance[1] requirement [section 67.819(a)&(b)], with code enforcement 2. Nuisance abatement with costs charged back to property owner 3. Condition in ongoing permit such as a Major Use Permit (if project has MUP) 4. Notice to new purchasers [67.819(e)] 5. Subdivision public report "white papers" to include notice of maintenance responsibility	6. Recorded easement agreement w/covenant binding on successors	1. Dedication to FCD. 2. Formation of benefit area 3. FCD maintenance documentation	1. Dedication to FCD or County. 2. FCD / County maintenance documentation
Funding Source(s)	None necessary	Security (Cash deposit, Letter of Credit, or other acceptable to County) for interim period. Agreement for security to contain provisions for release or refund, if not used.	**Start-up interim:** Developer fee covering 24 months of costs **Permanent:** FCD Assessment per FCD Act Sec 105-17.5	Varies: gas tax for BMP in road ROW, Transnet for CIP projects, Special funding or General funding for others.

[1] County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (S.D.Co.Code Sec. 67.801 et seq.)

BMP Maintenance Program

The following activities shall be performed as indicated. Direct questions to the Department of Public Works at (858) 694 3812

Preventive Maintenance and Routine Inspections

ROUTINE ACTIONS	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS	Comments
BMP	**BIOFILTER -- Swales and Slope Maintenance**					This is a Category one BMP
TOTAL SWALES / SLOPE MAINTENANCE						
BMP	**Drain Inlet Inserts**					
Sediment removal	Sediment more than 6 inches	Visual inspection	During wet season.	Replace Insert. Target completion while onsite conductiong inspection.		
Inspect for debris / trash	Sufficient debris / trash that could interfer with proper functioning of insert	Visual Observation	During wet season. Before and once during each target event (2 year	Remove and properly dispose of debris / trash. Target completion period while condutcting on site inspection		
Oil and Grease Removal	Absorbant granules (dark grey or greyer) or unit clogged with sediment	Visual Observation	At the end of each target storm (2 year event)	Replaceinsert absorbant		
Inspection for strucural integrity	Signs of rips, gashes and / or fallen media	Visual Observation	Twice per year (October and May)	Replace insert or immeadiately consult vendor to develop a course of action. Effect repairswithin 10 working days.	none	
Annual removal of medium	End of wet season (April 30)	Visual Observation	Annually (May)	Remove, characterize and properly dispose of media	none	
TOTAL DRAIN INLET INSERTS						
NOTES:						
1. The design storm event is a storm that has a one year, 24 hour recurrence frequency.						
2. A target storm event is a storm greater than 0.7525 inches of rainfall. For drain inlet inserts, a target storm event is a storm with a prediction of greater than 0.25 inches of rainfall.						

Preventive Maintenance and Routine Inspections						
						Comments
ROUTINE ACTIONS	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY	SITE-SPECIFIC REQUIREMENTS	

This Maintenance Indicator Document has been developed using site-specific information gathered by specialists trained in the identification of threatened and endangered species and their habitat. Information contained in this document includes guidance for inspection for possible threatened and endangered species harborage. Further, some of the maintenance recommendations are based on the requirements of specific plant species used in this Pilot Program. The recommendations provided in this document must be reassessed with respect to species and plant materials if the guidance contained herein is to be used for a separate project in another area.

ATTACHMENT E

Estimated Costs for BMP Program

(Annual costs)

Estimated O & M Costs for BMP Project

Estimated vlaues derived from Caltrans Pilot BMP Study. This spreadsheet will change as additional data becomes available.

						Labor			Equipment				Materials		Total
						Per. Hrs	Rate	Cost	Type	Days	rate	Cost	Item	Cost	Cost
Drain Inlet Inserts								$ -				$ -			$ -
Preventive Maintenance and Routine Inspections															
ROUTINE ACTIONS	**MAINTENANCE INDICATOR**	**FIELD MEASUREMENT**	**MEASUREMENT FREQUENCY**	**MAINTENANCE ACTIVITY**	**SITE-SPECIFIC REQUIREMENTS**										
Inspect for debris / trash	Sufficient debris / trash that could interfer with proper functioning of insert	Visual Observation	During wet season. Before and once during each target event (@	Remove and properly dispose of debris / trash. Target completion period while condutcting on site inspection					light truck						$1,000.00
medium replacement	Schedule replacement or damaged medium		medium replacement once a year (April 30)	Remove, characterize and properly dispose of medium											$183.00
TOTAL DRAIN INLET INSERTS								$ 583.00				$ 600.00		0	$1,183.00

NOTES:

1. The design storm event is a storm that has a one year, 24 hour recurrence frequency.
2. A target storm event is a storm greater than 0.7525 inches of rainfall. For drain inlet inserts, a target storm event is a storm with a prediction of greater than 0.25 inches of rainfall.

This Maintenance Indicator Document has been developed using site-specific information gathered by specialists trained in the identification of threatened and endangered species and their habitat. Information contained in this document includes guidance for inspection for possibl and endangered species harborage. Further, some of the maintenance recommendations are based on the requirements of specific plant species used in this Pilot Program. The recommendations provided in this document must be reassessed with respect to species and plant ma guidance contained herein is to be used for a separate project in another area.